are sometimes found to divide. Whether these processes ultimately obtain a sheath of myeline could not be decided. The occurrence of apolar cells is highly improbable. Of the other cranial ganglia, the otic, spheno-palatine, and submaxillary ganglia must be considered as belonging to the sympathetic system, by reason of their histological structure. As regards the ciliary ganglia the author is not quite decided. His histological researches compel him to regard it as a sympathetic ganglion, while Schwalbe's investigations in comparative anatomy demonstrate it as the true ganglion of the motor oculi.

THE DILATOR NERVES OF THE PUPIL.—M. François-Franck publishes in the laboratory reports of Marey, iv, 1879–79, the following interesting researches, of which we find an abstract in the *Centralblatt f. d. Med. Wiss.*, No. 15, 1881.

The movements of the iris, as well as of all other delicate tissues, are under the influence, at least to some extent, of the blood-vessels, but not entirely so. The dilator nerves of the iris separate themselves from the vaso-motor nerves at two points—one right over the superior cervical ganglion, the other at the level of the ciliary nerves. Franck found that above the superior cervical ganglion two fibres enter the skull through the carotid canal. One of these dilates the pupil, when irritated, without influencing the vessels. On testing the nerves which pass from the ophthalmic (ciliary) ganglion along the optic nerve, two sets of fibres are likewise found, mainly contractors, but also some dilators. It can likewise be shown that irritation of the sympathetic nerve produces dilatation of the pupil much sooner than vascular contraction, and that the former result does not last as long as the latter.

Division of the fifth, fourth, and third dorsal communicating rami (of the sympathetic) causes a slight momentary dilatation of the pupil. The same result is obtained by dividing the first and second dorsal rami, as well as the branches passing from the eighth, seventh, sixth, and fifth cervical roots to the first thoracic ganglion. This ganglion, therefore, receives dilator fibres coming from the cord in an ascending as well as in a descending direction. They ascend thence through the anterior branch of the loop of Vieussens to the inferior cervical ganglion. The upper thoracic ganglion serves as a tonic centre for the dilator nerves of the pupil.

The dilator fibres thence ascend with the cervical sympathetic through the first cervical ganglion, reaching the iris ultimately by way of the Gasserian ganglion and ophthalmic branch of the trigeminus. Other dilator fibres exist in the fifth nerve even before it reaches its ganglion, but, on cutting these, the reflex dilatation of the pupil is not interfered with as long as the filaments derived from the sympathetic are intact. Section of the ophthalmic ramus (5th nerve) of course contracts the pupil, but irritation of its peripheral end does not dilate, on account of reflex activity of the motor oculi started by the irritation of fibres of recurrent sensibility. Total dilatation of the pupil can be induced by irritating a single one of the ciliary nerves. The effect is *very slow* on having a mild current, but prompt with stronger stimulus.

The contracting fibres exist in the trunk of the third nerve passing through the ciliary ganglion into the ciliary nerves. Section of the latter produces a more decided effect than division of the motor oculi, on account of a tonic action of the ganglion. The entire iris can be affected by irritation of a single ciliary nerve, probably on account of abundant peripheral inosculation. Simultaneous and equal irritation of ciliary nerves and cervical sympathetic produces only dilatation (by interference). But on using feeble currents on the sympathetic nerves and subjecting the motor oculi to strong reflex stimulation by light, the pupil contracts at first, dilating moderately afterward.

THE INFLUENCE OF THE FIRST CERVICAL GANGLION ON THE IRIS has been examined in frogs by J. Tuwim (*Pflüger's Archiv*, vol. 24, p. 115). By cutting the cervical sympathetic on one side, and extirpating the ganglion on the other, he finds on the latter side a narrower pupil. In other words, the presence of the ganglion exerts a tonic influence on the musculature of the iris. In order to avoid errors, the definite observations should be made 24 hours after the operation, to escape the effects of transitory irritation. The statement is one of capital importance, since this would be the first instance of any well-proven action of a sympathetic ganglion. The result can be demonstrated also by the destruction of the cord and brain and of the ganglion of one side, whereupon the corresponding pupil contracts more than the pupil still connected with its ganglion. The ganglion does not receive any pupil-dilating fibres by anastomosis from the hypoglossal, as Budge had asserted. For the mammal the author claims, likewise, a direct influence of the first cervical ganglion on the iris. He